

What Is Claimed Is:

1. A projection type image display apparatus comprising:

a lamp unit which emits light;

three reflective type image display devices as light valve means which make an optical image according to an image signal;

a color separation unit which separates light from the lamp unit into three color light components and lets them impinge on the corresponding color reflective type image display devices;

a color combining unit which combines the three color light components from the reflective type image display devices; and

a projection lens which projects a color-combined optical image;

flat reflective type polarizing plates as polarizers/analyzers for the reflective type image display devices which, by their diffraction function, reflect primary light polarized in a specified direction and transmit secondary light polarized in a direction virtually perpendicular to the specified direction; and

auxiliary analyzers which transmit either the primary polarized light or the secondary polarized light on an exit side of the reflective type polarizing plates,

wherein:

the color combining unit includes a color combining prism and

three color light components resulting from color separation by the color separation unit reach the reflective type image display devices through the reflective type polarizing plates and the reflected light which constitutes an optical image made by the reflective type image display devices enters the color combining unit through the reflective type polarizing plates.

2. A projection type image display apparatus comprising:

a lamp unit which emits light;

three reflective type image display devices as light valve means which make an optical image according to an image signal;

a color separation unit which separates light from the lamp unit into three color light components and lets them impinge on the corresponding color polarizing plates image display devices;

a color combining unit which combines the three color light components from the polarizing plates image display devices;

a projection lens which projects a color-combined optical image;

flat reflective type polarizing plates as polarizers/analyzers for the reflective type image display devices which, by their diffraction function, reflect primary light polarized in a specified direction and transmit secondary light polarized in a direction virtually perpendicular to the specified direction;

auxiliary polarizers which transmit either the light polarized in the specified direction or the light polarized in a direction virtually perpendicular to the specified direction on the exit side of the reflective type polarizing plates; and

auxiliary analyzers which transmit light polarized in another direction different from the polarization direction of the light transmitted by the auxiliary polarizers on the exit side of the reflective type polarizing plates,

wherein:

the color combining system includes a color combining prism and

three color light components resulting from color separation by the color separation system reach the reflective type image display devices through the reflective type polarizing plates and the reflected light which constitutes an optical image made by the reflective type image display devices enters the color combining unit through the reflective type polarizing plates.

3. The projection type image display apparatus as claimed in Claim 1, wherein, on an entrance side of the reflective type polarizing plates, there is a polarization/separation prism which reflects either light polarized in the specified direction or light polarized in a direction virtually perpendicular to the specified direction, and transmits the other polarized light.

4. The projection type image display apparatus as claimed in Claim 2, wherein a contrast ratio of the auxiliary analyzers is higher than that of the auxiliary polarizers.

5. The projection type image display apparatus as claimed in Claim 1, wherein reflective surface forms of the three reflective type polarizing plates are such that, taking the surface form of one of them as a reference, a dimensional difference of the surface forms of the other two plates from the reference is within  $\pm 4$  ( $\lambda/\text{inch}$ ).

6. The projection type image display apparatus as claimed in Claim 2, wherein reflective surface forms of the three reflective type polarizing plates are such that, taking the surface form of one of them as a reference, a dimensional difference of the surface forms of the other two plates from

the reference is within  $\pm 4$  ( $\lambda/\text{inch}$ ).

7. The projection type image display apparatus as claimed in Claim 1, wherein the reflective type polarizing plates, reflective type image display devices and auxiliary analyzers are inside a hermetically sealed structure or on its boundaries.

8. The projection type image display apparatus as claimed in Claim 2, wherein the reflective type polarizing plates, reflective type image display devices and auxiliary analyzers are inside a hermetically sealed structure or on its boundaries.

9. The projection type image display apparatus as claimed in Claim 1, wherein the reflective type image display devices are disposed on a structure which is asymmetric as viewed from a pixel center and a short side of the structure is nearer to the color combining prism as viewed from the pixel center.

10. The projection type image display apparatus as claimed in Claim 2, wherein the reflective type image display devices are disposed on a structure which is asymmetric as viewed from a pixel center and a short side of the structure is

nearer to the color combining prism as viewed from the pixel center.

11. The projection type image display apparatus as claimed in Claim 1, wherein optical axes of reflection planes of the three reflective type image display devices are oriented in almost the same direction.

12. The projection type image display apparatus as claimed in Claim 2, wherein optical axes of reflection planes of the three reflective type image display devices are oriented in almost the same direction.

13. The projection type image display apparatus as claimed in Claim 1, wherein the reflection planes of the three reflective type image display devices are such that, taking one of them as a reference plane, heights of the other two planes are almost equal to a height of the reference plane.

14. The projection type image display apparatus as claimed in Claim 2, wherein the reflection planes of the three reflective type image display devices are such that, taking one of them as a reference plane, heights of the other two planes are almost equal to a height of the reference plane.

15. The projection type image display apparatus as claimed in Claim 1, wherein the three color light components are R light, G light, and B light and a diffraction pitch of the reflective type polarizing plate in a B light path is shorter than that of the reflective type polarizing plate in an R light path.

16. The projection type image display apparatus as claimed in Claim 2, wherein the three color light components are R light, G light, and B light and a diffraction pitch of the reflective type polarizing plate in a B light path is shorter than that of the reflective type polarizing plate in an R light path.

17. A projection type image display apparatus comprising:

a lamp unit which emits light;

three reflective type image display devices as light valve means which make an optical image according to an image signal;

a color separation unit which separates light from the lamp unit into three color light components and lets them impinge on the corresponding color reflective type image display devices;

a color combining unit which combines the three color light components from the reflective type image display

devices;

a projection lens which projects a color-combined optical image;

flat reflective type polarizing plates as polarizers/analyzers for the reflective type image display devices which, by their diffraction function, reflect primary light polarized in a specified direction and transmit secondary light polarized in a direction virtually perpendicular to the specified direction;

auxiliary analyzers which transmit either the primary polarized light or the secondary polarized light on an exit side of the reflective type polarizing plates:

a quarter-wave plate located between the color combining unit and the projection lens; and

a half-wave plate which is located between the color combining unit and the reflective type image display devices to rotate virtually linearly polarized light approximately 90 degrees,

wherein:

the color combining unit includes a color combining prism and

three color light components resulting from color separation by the color separation unit reach the reflective type image display devices through the reflective type polarizing plates and the reflected light which constitutes



an optical image made by the reflection image display devices enters the color combining system through the reflective type polarizing plates; and

the auxiliary analyzers are attached to three entrance planes of the color combining prism which are light paths and a quarter-wave plate is attached to one exit plane of the prism.

18. The projection type image display apparatus as claimed in Claim 17, wherein the reflective type image display devices are disposed on a structure which is asymmetric as viewed from a pixel center and a short side of the structure is nearer to the color combining prism as viewed from the pixel center.

19. The projection type image display apparatus as claimed in Claim 17, wherein optical axes of reflection planes of the three reflective type image display devices are oriented in almost the same direction.

20. The projection type image display apparatus as claimed in Claim 17, wherein the reflection planes of the three reflective type image display devices are such that, taking one of them as a reference plane, heights of the other two planes are almost equal to a height of the reference plane.